

LISTING OF CLAIMS:

E1
amt

Claim 1 (Currently Amended): An information input processing computer system for mapping gestures to keys of a virtual keyboard, the system comprising one or several cameras, one or more memories with CPU connected to the cameras, and processes running in the CPU that ~~asseeiates~~ associate gesture movements with typing and produce gesture associated textual output, wherein said processes capture gesture images, classify each types of gesture image into a respective one of a plurality of classes depending on the type of gesture, and associate each of the classes with one ~~of the keys of the virtual keyboard~~ or more possible keys, assign a probability to each of said possible keys, and integrate the probabilities assigned to the possible keys to identify a word for a sequence of gestures.

Claim 2 (Original): The gesture-key mapping system as in claim 1, where a feedback is provided to the user on what kind of keys are associated with the user's gestures.

Claim 3 (Original): The gesture-key mapping system as in claim 2, where the feedback is provided using one or more of the following: displaying keys on a display, playing sounds labels for keys, displaying image indicators on a display, playing special sound indicators, projecting the keyboard to any surface, and displaying picture of the keyboard with user's hands.

Claim 4 (Currently Amended): An information input processing, gesture-key mapping computer system, the system comprising one or several cameras, one or more memories with CPU connected to the cameras, and processes running in the CPU that ~~associates~~ associate gesture movements with typing and produce gesture associated textual output, where the gesture-key processing is provided using the following modules:

- El
cont
- a) a gesture capturing module that captures gestures through camera sensors;
 - b) a gesture classifier module that classifies each type of gesture into a respective one of a plurality of classes ~~of~~ depending on the type of gesture movements;
 - c) an associator module for associating gesture classes or sequence of gesture classes with one or ~~several most probable~~ more possible keys and assigns a probability to each of said possible keys; and
 - d) an integrator module that ~~integrate sequence of candidate of most probable keys into unique output key sequence~~ integrates the probabilities assigned to the possible keys to identify a word for a sequence of gestures.

Claim 5 (Original): The system as in claim 4, where the integrator module includes one or more of the following:

- a) language module component that estimate probabilities of word strings corresponding to key candidate sequences;
- b) character frequency module that estimate probabilities of character strings corresponding key candidate sequences;
- c) confusable matrix that estimate how often correct gesture classes are confusable with another gesture classes;

- d) gesture classes probability model that estimate probability of observing a string of gesture classes given a sequence of gesture frames;
- e) computation of a probability of production a sequence of keys given a string of gesture frames;
- f) generation of a lattice of sequences of keys given sequence of gesture frames;
- g) finding the most probable sequence of keys from the lattice of key candidate strings.

E1
cmf
Claim 6 (Original): A system according to Claim 5, wherein each sequence of keys receives a probability score, and the sequences of keys that receive low scores are removed and are not continuing when new candidates for keys arrive.

Claim 7 (Original): A system according to Claim 1, further comprising a gesture correlator module to allow to adjust automatically an invisible keyboard to hand positions.

Claim 8 (Currently Amended): The method for producing a textual output in which a user makes typing like gestures without the presence of a keyboard and the gestures are associated with the most probable keys that would be typed if a keyboard were presented, said method including the steps of using a computer system to map gestures to keys of a virtual keyboard, including the steps of running processes on the computer to capture gesture images, to classify each type of gesture image into a respective one of a plurality of classes depending on the type of gesture, and to associate each of the classes with one of the keys of the virtual keyboard or more possible keys, assign a probability to each of said possible keys, and integrate the probabilities assigned to the possible keys to identify a word for a sequence of gestures.

E1
cmt

Claim 9 (Currently Amended): The method for producing a textual output in which a user makes typing like gestures without the presence of a keyboard and the gestures are associated with the most probable keys that would be typed if a keyboard were presented, said method including the step of using a computer system to map gestures to keys of a virtual keyboard, including the step of running processes on the computer to capture gesture images, to classify each type of gesture image into a respective one of a plurality of classes depending on the type of gesture, and to associate each of the classes with one ~~of the keys of the virtual keyboard~~ or more possible keys, assign a probability to each of said possible keys, and integrate the probabilities assigned to the possible keys to identify a word for a sequence of gestures, and wherein the probability is computed using HMM.

Claim 10 (Currently Amended): A method of typing using a virtual keyboard having a multitude of virtual keys, comprising the steps:

making typing gestures without any real keyboard;

sensing the typing gestures; and

producing, from the sensed typing gestures, gesture associated textual output including the step of running processes on a computer to capture gesture images, classify each type of gesture image into a respective one of a plurality of classes depending on the type of gesture, and to associate each of the classes with one ~~of the virtual keys of the virtual keyboard~~ or more possible keys, assign a probability to each of said possible keys, and integrate the probabilities assigned to the possible keys to identify a word for a sequence of gestures.

Claim 11 (Original): A method according to Claim 10, wherein the typing gestures are made by a person, and further comprising the steps of providing feedback to the person on texture output associated with the gestures.

Claim 12 (Original): A method according to Claim 11, wherein the step of providing feedback includes the step of displaying an image of typing keys associated with the gestures.

Elmt
Claim 13 (Original): A method according to Claim 10, further comprising the step of generating an image of a keyboard; and wherein the step of making typing gestures includes the step of making typing gestures relative to said image as if said image were a real keyboard.

Claim 14 (Currently Amended): A method of typing using a virtual keyboard, comprising the steps:

making typing gestures without any real keyboard;

sensing the typing gestures; and

producing, from the sensed typing gestures, gesture associated textual output; and

wherein the producing ~~step~~ steps includes the step of classifying each type of gesture into a respective one of a plurality of classes depending on the type of gesture, associating each of said classes with one or more possible keys, assigning a probability to each of said possible keys, and integrating the probabilities assigned to the possible keys to identifying a word for a response of gestures.

Claim 15 (Original): A method according to Claim 14, wherein the producing step further includes the step of associating gesture classes with individual typing keys.

Claim 16 (Previously Presented): A method according to Claim 14, further comprising providing training data in words or sentences with certain timing data.

E1
cont

Claim 17 (Currently Amended): A typing system using a virtual keyboard, comprising means for sensing typing gestures made without any real keyboard; and

means for producing, from the sensed typing gestures, gesture associated textual output said producing means including a computer and processes running on the computer to capture gesture images, to classify each type of gesture image into a respective one of a plurality of classes depending on the type of gesture, and associate each of the classes with one of the keys of the virtual keyboard or more possible keys, assign a probability to each of said possible keys, and integrate the probabilities assigned to the possible keys to identify a word for a sequence of gestures.

Claim 18 (Original): A system according to Claim 17, wherein the typing gestures are made by a person, and further comprising means for providing feedback to the person on texture output associated with the gestures.

Claim 19 (Original): A system according to Claim 18, wherein the means for providing feedback includes means for displaying an image of typing keys associated with the gestures.

Claim 20 (Original): A system according to Claim 17, further comprising means for generating an image of a keyboard; and wherein the sensing means includes means for sensing typing gestures made relative to said image as if said image were a real keyboard.

Claim 21 (Currently Amended): A typing system using a virtual keyboard, comprising
means for sensing typing gestures made without any real keyboard; and
means for producing, from the sensed typing gestures, gesture associated textual
output; and

*E1
Amended*
wherein the producing means includes means for classifying each type of gesture into a respective one of a plurality of classes depending on the type of gesture, associating each of said classes with one or more possible keys, assigning a probability to each of said possible keys, and integrating the probabilities assigned to the possible keys to identifying a word for a response of gestures.

Claim 22 (Original): A system according to Claim 21, wherein the producing means further includes means for associating gesture classes with individual typing keys.